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**US 5170488 A**

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(54) **User controlled handoff**

(57) A method for a user controlled handoff is provided in a communications system having at least one handset and a plurality of base stations, including the steps of receiving service from a first base station at the handset and transferring service from the first base station to a second base station by manual call transfer implemented by the user.

In a preferred embodiment the handset is registered for use on the first base station and the second base station.

In an alternative embodiment the transfer includes mapping of a particular zone with a respective base station.

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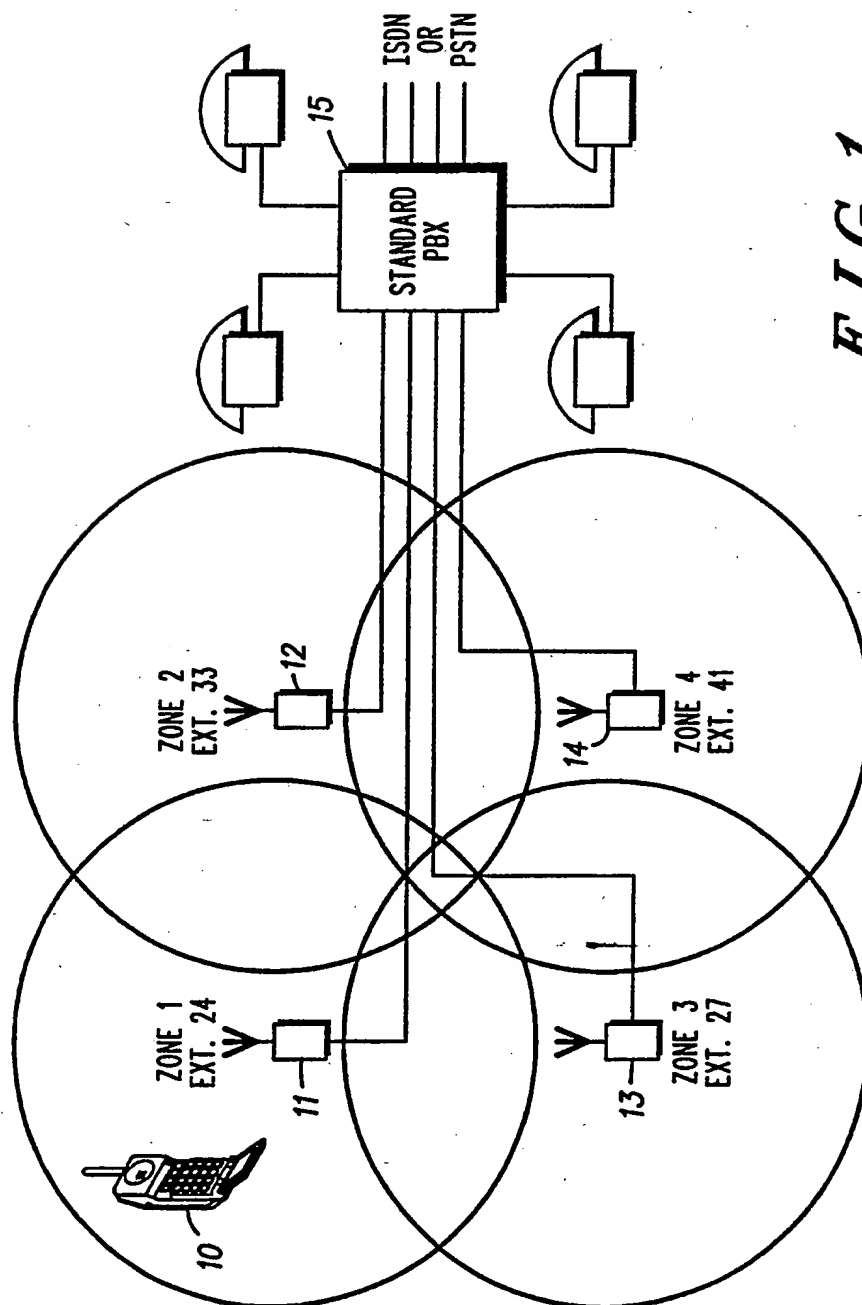
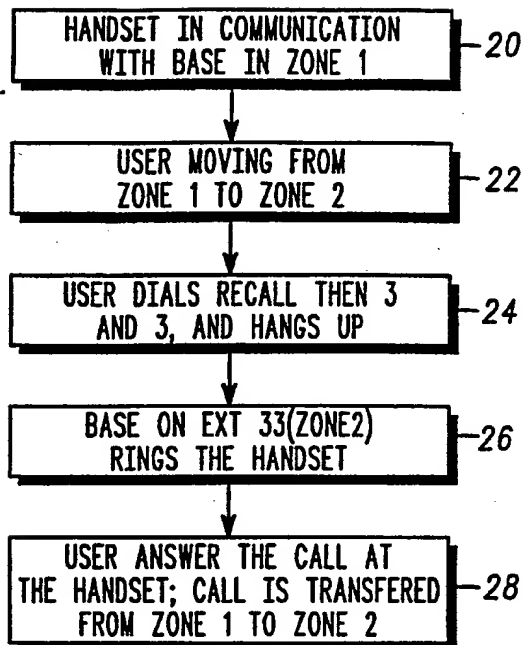
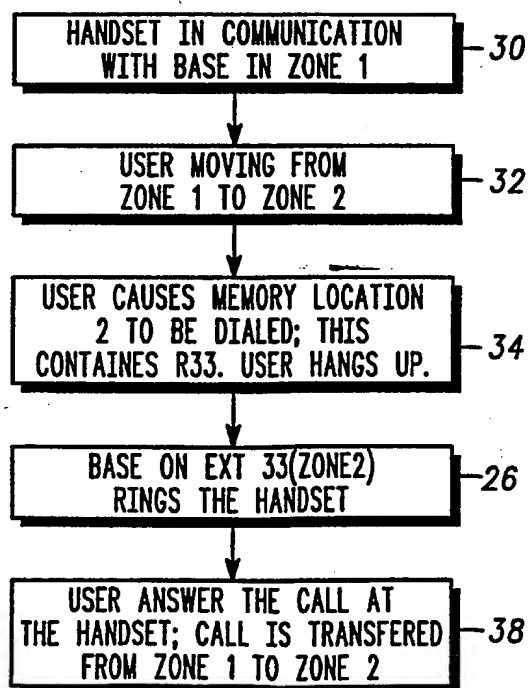


FIG. 1

*FIG. 2**FIG. 3*

## COMMUNICATIONS SYSTEM

### Field of the Invention

This invention relates in general to cordless telephone systems and  
5 more particularly to a method of transferring service in a cordless telephone system.

### Background to the Invention

Cordless telephone systems include Cordless PBX (CPBX) systems or  
10 cordless public access systems. Typically such cordless telephone systems include a plurality of cordless (radio) handsets or Cordless Portable Parts (CPPs) and associated Cordless Fixed Parts (CFPs). The Cordless Fixed Parts (CFPs), also known as Radio Fixed Parts (RFPs), are (radio) base stations. The base stations are typically sited in an office environment in  
15 the case of Cordless PBXs (CPBXs) or in a public environment, in the case of public access systems. Such public access cordless systems are also known as telepoint. Telepoint generically applies to a "one-way" service, providing out-going calls from the cordless handsets, but may also apply to incoming call service in the telepoint environment, which is known as "two-way"  
20 telepoint.

The cordless portable parts are essentially low power cordless telephone handsets, and the CFPs or RFPs are the associated base stations, providing connection through a centrally integrated telephone switch to the wired services (e.g. PSTN or ISDN). In general, such telephone switches  
25 transmit and switch the voice traffic digitally, and are computer controlled. It is an essential part of these types of equipment that handsets may not communicate directly with another handset, other than via base stations. Examples of these types of products include CT2 (second generation cordless telephones) and DECT (Digital European Cordless Telephone).

30 Modern cordless telephones such as CT2 (Second Generation Cordless Telephone) and DECT (Digital European Cordless Telephone) typically offer more functionality than earlier cordless telephone technologies. These early Cordless Telephones were generally available as a "matched pair", where a cordless handset and its base station were hard-coded to each other. Thus, a  
35 handset could only work with one respective base station.

The modern cordless telephones offer the ability for a cordless handset to be "registered" or be identifiable to several cordless telephone base

stations, and equally, for a cordless telephone handset to register or identify several different cordless telephone base stations.

With such later generation cordless telephones exhibiting this ability, it is possible for a single cordless telephone base station to have several  
5 cordless handsets registered to it, such that when the base station is free, any one of the handsets registered to the base station can establish a radio link to the base station. Similarly, when the base station is rung for an incoming call, the base station can cause one or several or all of the handsets registered to it to ring, and any of the ringing handsets is then capable of  
10 answering the incoming call at the base station.

Similarly, a cordless handset that is registered to several cordless base stations is capable, either using some automatic technique, or under user control, of targeting or identifying over a signalling channel a specific cordless base station out of several to which it is registered, in order to  
15 establish a radio link prior to making a call.

It is also a feature of these cordless telephones to have repertory dial memories, either in the cordless handset or the cordless base station or both, such that the user is able to cause the pre-stored digits in such repertory memories to be dialled out on user command from the cordless handset or  
20 base station.

Once a handset is in a communication via service from a first base station the handset must stay in the area covered by the first base station until the communication is ended. The handset cannot travel outside the area of service without losing its communication. If the handset, currently  
25 involved in a communication, desires to travel to another area covered by service of a second base station and desires to be served by the second base station, it must terminate its communication and re-establish a link with the second base station in order to receive or initiate a new communication.

In highly integrated, complex, cordless PBXs, expensive handover solutions are being proposed. In order to provide (automated) hand-over, these cordless PBXs need centralised control and complex signalling and control of a number of cordless radio base stations.  
30

It is desirable to have a simple, low cost method of providing a user controlled handoff in a cordless telephone system having a plurality of  
35 available base stations.

### Summary of the Invention

According to the present invention, there is a method provided for a user controlled handoff in a communications system having at least one handset and a plurality of base stations, including the steps of receiving  
 5 service from a first base station at the handset and transferring service from the first base station to a second base station by manual call transfer implemented by the user.

In a preferred embodiment the handset is registered for use on the first base station and the second base station.

10 In an alternative embodiment the transfer includes mapping of a particular zone with a respective base station.

### Brief Description of the Drawing

FIG. 1 shows a schematic view of a PBX with cordless telephone base  
 15 stations attached to its extension lines.

FIG. 2 shows a flow chart according to a preferred embodiment of the present invention.

FIG. 3 shows a flow chart according to an alternative embodiment of the present invention.

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### Detailed Description of the Preferred Embodiment

Referring to FIG. 1, an integrated telepoint system is shown having at least one handset 10 able to communicate over a communications resource to a respective base stations 11-14. The base station 1 is connected to a  
 25 standard PBX 15 which communicates to an ISDN or PSTN network. In FIG. 1, there are four zones indicating service coverage of each base station. Each zone's extension number for its respective base station is shown.

In such PBX environment of the present invention, it is possible to have several cordless base stations distributed over an area, with a single  
 30 handset registered to all of them. The base stations each have an area of coverage and are distributed such that there is some overlap of coverage between the base stations.

According to the present invention, if the handset 10 is in communication with a first base station 11, and the user intends moving  
 35 from the coverage area of the first base station into the coverage area of a second base station, the user is able to transfer the call from the first base station in use to a known extension number to which the second base station

is connected, by invoking the normal call transfer feature on a PBX (i.e. recall, followed by dialling the extension number). When the user then hangs up, the call is transferred to the new extension number, causing the second base station connected to the extension to ring the same handset, and  
 5 the user then proceeds to answer the call. This causes a user controlled hand over of the call from one coverage area of one base station to another.

Referring to FIG. 2, a method according to the present invention is shown describing with reference the communications system of FIG. 1. In  
 10 step 20, the handset 10 is in communication with the first base station 11 in zone 1. If the handset is moving to zone 2 serviced by the second base station 12 as in step 22, the user would dial recall, followed by 33, then hang up, step 24. This causes the call to be transferred to extension 33, which in turn causes the base station in zone 2 to ring the handset, step 26. The user then answers the call at the handset as in step 28.

15 With suitable planning, and a certain amount of user knowledge, this concept can be extended to a reasonably large area of coverage using several base stations. These base stations may be single line base stations, but may more likely be multi-line base stations sharing a single enclosure.

An alternative embodiment of the present invention relates to making  
 20 the procedure somewhat more transparent to the user by automating it to an extent. Instead of the user having to remember the exact extension number of each base station in each area of coverage, the cordless handsets and/or cordless base stations can each be programmed with several pre-stored digit sequences in repertory dialling memory, such that the user needs only to  
 25 remember "zone" numbers. The user can then cause the base to dial out a nominated digit sequence (repertory memory) by suitable signalling from the handset to the base, or by the cordless handset sending the appropriate dialled digit sequence to the cordless base station.

For example, if a base station can store up to 10 such digit sequences,  
 30 then in each base station covering an expanded area, repertory location 1 is programmed with the extension of the extension number covering zone 1, repertory location 2 with the extension number for zone 2, and so on. Referring to FIG. 1, memory location 1 in each base station (except that in zone 1) would contain "24", location 2 would contain "33", location 3 would  
 35 contain "27", and location 4 would contain "41".

Similarly, if the handset can store up to 10 such repertory dialled sequences, then in each handset, repertory location 1 is programmed with

the extension number covering zone 1, repertory location 2 with the extension number for zone 2, and so on. Thus, memory location 1 would contain "24", location 2 would contain "33", location 3 would contain "27", and location 4 would contain "41".

5        When a user in zone 2 wishes to hand their call over to a base station in zone 1, the user simply invokes the key sequence at the handset to cause the contents of repertory location 1 in the handset or in the current base station to be dialled out automatically by the base station in zone 2, the user hangs up, and the zone 1 base station will start ringing the handset, which  
10      the user can then answer.

This procedure can be automated further by allowing the "recall" function to be stored as a pseudo-digit in the repertory memory of the handsets or base stations. For example, memory location 1 would contain "R24", which is equivalent to "Recall 2,4", and so on.

15        Further still, it is possible to allow the storage of a pseudo-digit in the repertory memories to cause the base station to terminate the existing link to the handset automatically. In this case, the user, by invoking the dialling of the selected repertory location, causes the base station to apply recall to the line (and thus obtain new dialtone), dial out the digits of the extension  
20      number, and then clear down the existing link to the handset. The user simply waits for the cordless handset to ring again, and can answer the call without having to actively clear the existing call.

Referring to FIG. 3, the handset 10 is in communication with the first base station 11 which services zone 1, step 30. The handset moves to zone 2 serviced by the second base station 12 as in step 32. The user causes  
25      memory location 2 to be dialled which contains R33, then the user hangs up, step, 34. Base station 12 on extension 33 (zone 2) rings the handset, step 36. The user answers the call at the handset as in step 38. In essence, memory location 2 would contain "R33E " which when invoked by the user would  
30      cause the sequence "Recall, 3, 3, End" to occur.

A further refinement may be provided by adding an automatic answer feature in such cordless handsets, such that when the call is transferred, and the handset is rung by the new base station, the handset automatically answers the call. This refinement reduces the amount of user interaction to  
35      simply invoking the correct zone identity from the cordless handset.

The present invention provides a relatively simple user controlled hand-over capability which provides an in-expensive alternative to the



complex, highly integrated cordless PBXs. The method of the present invention exploits the capabilities of existing PBXs with the addition of the required number of cordless telephone base stations, and no modification is required of the existing PBX.

- 5       The present invention provides "user controlled" hand over between several simple "residential" cordless telephone base stations from a single cordless telephone handset, all connected to a conventional PBX.

Claims

1. A method for providing a user controlled handoff in a communications system having at least one handset and a plurality of base stations, the  
5 method comprising the steps of:  
    receiving service from a first base station at the handset;  
    transferring service from the first base station to a second base station by manual call transfer implemented by the user.
- 10 2. The method of claim 1 wherein the handset is registered for service availability.
3. The method of claim 1 wherein the communications system is a standard PBX system.
- 15 4. The method of claim 1 transfer includes mapping of a particular zone with a respective base station.
5. A method for providing a user controlled handoff substantially as herein  
20 described with reference to FIGS. 2 or 3 of the drawing.

Patents Act 1977  
Examiner's report to the Comptroller under Section 17  
(the Search report)

Application number  
GB 9413124.0

Relevant Technical Fields

Search Examiner  
MR N HALL

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H4K (KY4D14H KY4P)

(ii) Int Cl (Ed.5) H04Q 7/04

Date of completion of Search  
15 SEPTEMBER 1994

Databases (see below)

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Documents considered relevant following a search in respect of Claims :-  
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(ii) ONLINE: WPI

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|----------|--|---|----------------------|
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| X        | GB 866077                                  | (TESLA) whole document, see especially page 1 line 39     | 1 at least           |
| X        | EP 0496622 A2                              | (NEC) whole document                                      | 1 at least           |
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